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Conceptualizing Health Consequences of Hurricane Katrina From the Perspective of Socioeconomic Status Decline

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Abstract

Objective—The long-term health impact of acute unemployment and socioeconomic resource deficit has not been shown to be unique from the effects of stable socioeconomic status (SES) and serious life circumstances, such as trauma. This study examined associations between these acute socioeconomic declines and health of hurricane survivors, independent of prehurricane SES and hurricane trauma.

Method—Participants were 215 African American adults (60% female, mean age = 39 years) living in the Greater New Orleans area at the time of Hurricane Katrina and survey 4 years later. The survey included prehurricane SES measures (i.e., education and neighborhood poverty level); acute unemployment and deficits in access to SES resources following Hurricane Katrina; and posthurricane health events (i.e., cardiometabolic events, chronic pain, posttraumatic stress disorder [PTSD], and major depressive disorder [MDD]).

Results—Acute unemployment was associated with odds of experiencing a cardiometabolic event (odds ratio [OR] = 5.65, $p < .05$), MDD (OR = 2.76, $p < .05$) and chronic pain (OR = 2.76, $p < .05$), whereas acute socioeconomic resource deficit was associated with odds of chronic pain (OR = 1.93, $p < .001$) and MDD (OR = 1.19, $p < .05$). Associations were independent of prehurricane SES, hurricane trauma, potentially chronic SES resource deficits, and current unemployment.

Conclusions—This study shows that acute socioeconomic decline following a natural disaster can create long-term health disparities beyond those created by prehurricane SES level and traumatic hurricane experiences. Findings suggest that early intervention postdisaster to reduce pervasive socioeconomic disruption may reduce the long-term health impact of disasters.

Keywords

disaster; SES; unemployment; mental health; cardiometabolic

Socioeconomic status (SES) is defined in two major ways: rank order or prestige in one's society, for example, by occupational prestige or educational status, and access to resources, for example, by household income or housing quality. By either definition, those who are lower in SES positions are less healthy (for reviews, see Braveman, Egerter, & Williams, 2011, and Matthews & Gallo, 2011). It is known that SES is remarkably stable across the life span: those who are from lower SES families are likely also to be lower SES in adulthood (e.g., Melchior, Moffitt, Milne, Poulton, & Caspi, 2007). Even so, abrupt or temporary declines in SES do occur and could affect health. However, little is known about whether the effects of abrupt or temporary decline in SES are cushioned by higher SES prior to decline, such that no long-term health change occurs, or whether abrupt changes in SES have a long-term impact on health, regardless of SES level prior to the decline.

The context of Hurricane Katrina provides an opportunity to gain knowledge about the long-term health effects of abrupt declines in SES in conjunction with prehurricane SES. Hurricane Katrina led to sudden job loss and blocked access to SES resources in a population already diverse in SES. Sudden job loss and SES resource deficits can be considered indicators of acute SES decline. The natural disaster context provides the opportunity to test the robustness of the association between these acute declines in SES and long-term health against a backdrop of other significant problems, especially traumatic stress associated with natural disasters of the proportion of Hurricane Katrina, for example, life-threatening experiences. Often disaster research is framed in the context of trauma, whereas our perspective focuses on the effects of declines in SES that can occur with disasters. The current study examined the associations of posthurricane immediate job loss and SES resource deficits with health 4–5 years' posthurricane, covarying for stable SES and hurricane trauma. We focused on mental and physical health outcomes with known associations with SES indicators, stress, and trauma; that is, major depressive disorder (MDD), posttraumatic stress disorder (PTSD), cardiometabolic diseases, and chronic pain.

The incidence and/or prevalence of these health outcomes among Hurricane Katrina survivors in New Orleans were elevated posthurricane, compared with both the general population and to New Orleans residents prehurricane (Burton et al., 2009; Centers for Disease Control and Prevention, 2006; Jiao et al., 2011; Kessler, Galea, Jones, & Parker on behalf of the Hurricane Katrina Community Advisory Group, 2006; Lowe, Chan, & Rhodes, 2010; Patel, Gallagher, & Bloodworth, 2006; Rhodes et al., 2010). A few studies suggest that acute financial and housing difficulties and food insecurity were associated with higher rates of PTSD and MDD up to 2 years posthurricane (DeSalvo et al., 2007; Galea et al., 2007; Galea, Tracy, Norris & Coffey, 2008; West et al., 2008). Furthermore, those who were hospitalized for acute myocardial infarction 3 years after Hurricane Katrina were unemployed in greater proportions than those admitted prior to the hurricane (Jiao et al., 2011). Although prehurricane SES (i.e., income and receipt of public assistance) was not associated with number of diagnosed medical conditions 18 months' posthurricane, a

composite of hurricane-induced difficulties that included acute SES difficulties, losses, and traumas was (Rhodes et al., 2010). One way to conceptualize these results in the aggregate is that acute changes in SES caused by Hurricane Katrina led to adverse health outcomes post-Hurricane.

The available studies on the relationship between acute changes in SES and health after Hurricane Katrina share a number of limitations. First, most of the studies reviewed focused on specific subsamples of the New Orleans population, such as police personnel (West et al., 2008) and Tulane university employees (DeSalvo et al., 2007). The extant studies also only examined short- or medium-term (2 months' to 2 years' posthurricane) health effects of single SES difficulties. In addition, these studies did not comprehensively examine the SES changes that survivors experienced. For example, none examined the mental or physical health effects of unemployment attributable to the hurricane despite the fact that, 1 month after the hurricane, an estimated 25% of the labor force in affected areas were unemployed (U.S. Bureau of Labor Statistics, 2011).¹ We know that experiencing at least one period of unemployment is associated with a range of long-term adverse health outcomes, including depression, chronic inflammation, cardiovascular event incidence, and premature mortality, and that at least some of these associations are independent of income (Gallo, Bradley, Siegel, & Kasl, 2000; Gallo et al., 2006; Janicki-Deverts, Cohen, Matthews, & Cullen, 2008; Jin, Shah, & Svoboda, 1995). It is unclear whether sudden unemployment is associated with long-term health beyond the effects of prehurricane SES, significant traumas, and upheaval across other life domains. We also know that acute loss of access to material resources is associated with depressive mood, whereas chronic resource deficits may not be (Ennis, Hobfoll, & Schröder, 2000; Hobfoll, Johnson, Ennis, & Jackson, 2003). Survivors of Hurricane Katrina experienced delayed or denied access to government emergency funds and had to endure adverse conditions to access aid and basic living resources. No studies have used the context of Hurricane Katrina to examine whether the health effect of aggregate, hurricane-related deficits in SES resources is unique from the health effects of chronic low SES and hurricane trauma. It is also noteworthy that none of the Hurricane Katrina studies examined the potentially confounding effects of neighborhood SES (see Evans & Kantrowitz, 2002, for a review of the relationship between neighborhood conditions and health), especially given that Hurricane Katrina disproportionately affected some neighborhoods.

The current study improves on the limitations evident in this area of research by utilizing a socioeconomically diverse sample to investigate whether the health effects of acute SES decline (here, sudden unemployment and acute SES resource deficit) are independent from the effects of hurricane-related trauma and individual and neighborhood-level prehurricane SES in predicting long-term health. In addition, we examined within-group differences in acute SES decline and health among African Americans, who appear to have been at higher risk for posthurricane mental health difficulties (Harville, Xiong, Pridjian, Elkind-Hirsch, & Buekens, 2009; Sastry & VanLandingham, 2009). This group also had more difficulty securing employment after returning to New Orleans postevacuation (Oxfam America,

¹Galea, Tracy, Norris, and Coffey (2008) measured job loss but combined it with other financial stressors to create a dichotomous financial loss variable.

2008), and, as of 2010, continued to have drastically lower incomes than other ethnic groups in New Orleans, especially Whites (The Brookings Institution Metropolitan Policy Program & Greater New Orleans Community Data Center, 2010).

Hypotheses

We expected that those who experienced sudden unemployment within the month following the hurricane would be more likely to report experiencing cardiometabolic events and pain in the 4–5 years since the hurricane and to meet criteria for MDD and PTSD than those who did not, regardless of their prehurricane SES and traumatic hurricane experiences. We also expected that acute difficulties accessing SES-related resources within the month following the hurricane (henceforth referred to as *SES resource deficit*) would be associated with cardiometabolic events and pain in the 4–5 years since the hurricane and risk of meeting criteria for MDD and PTSD, regardless of prehurricane SES and traumatic hurricane experiences.

Method

Participants

Participant recruitment began in January 2010 and ended in September 2010. Participants were recruited through various avenues, including a popular barber shop/beauty salon, church congregations, a preventative medical and social services clinic, and major New Orleans universities and community colleges, as well as by word of mouth and snowball sampling. To be eligible for the study, individuals had to self-identify as African American, be 18 years or older, have been a resident of New Orleans when Hurricane Katrina made landfall, and be a current resident of New Orleans.

A community sample of 215 African American men and women completed the study. As shown in Table 1, mean age of the participants was 38.6 years, and 59.5% of participants were female. Participants were of diverse SES (i.e., mean education = 13.9 years [$SD = 3.12$], 70.2% were employed full- or part-time, and 10.2% did not have consistent housing). More participants were single and never married (46.5%) than any other marital status. Although this was not a stratified random sample of the population of New Orleans, it closely mirrors the demographics of Orleans Parish as of the 2009 census with respect to gender and distributions of age, marital status, and education (The Brookings Institution Metropolitan Policy Program & Greater New Orleans Community Data Center, 2010).

Participants received a \$12 Wal-Mart Stores, Inc. gift card for participation. All participants also received a list of city services and resource centers that assist residents with needs for mental health care, medical care, housing, employment, legal assistance, transportation, child and elderly care, and finances. Participants who evidenced difficulty dealing with past or current stress or trauma, depression, or anxiety were encouraged to seek professional help or contact a trusted physician, mental health provider, or minister for services.

Procedure

Institutional review board-approved consent forms, questionnaires, and resource lists were mailed to all eligible volunteers. After signing consent forms, they completed the questionnaires and returned the signed consent form and questionnaire packet in a stamped, preaddressed envelope. Two eligible volunteers did not return study materials.

Measures

Demographic covariates—*Age, gender, and marital status* were measured by self-report. Each of these demographic characteristics has been linked empirically to at least one of our outcomes.

Stable SES measures—*Education* was measured as self-reported highest years of education completed. *Prehurricane neighborhood poverty* was determined using the percentage below the poverty level in reported neighborhood of residence before the hurricane. Neighborhoods were matched with 5-digit Zip Code Tabulation Areas (ZCTAs). The 2000 New Orleans Census Data was used to obtain poverty data for each ZCTA. Participants who resided in ZCTAs with at least 30% of individuals below the poverty level were classified as living in a high poverty neighborhood prior to the hurricane.

Acute SES decline measures—*Acute unemployment* was assessed using one item that asked whether the participant was fired or temporarily laid off within the first month posthurricane. *SES resource deficit* was conceptualized as difficulties accessing SES-associated resources and assessed using responses to nine items from a 24-item questionnaire regarding hurricane experiences. This questionnaire was a modified version of the questionnaire used by Kessler and colleagues (2008). Some items were developed for the current study based on anecdotal knowledge of Katrina-related experiences and the qualitative oral interviews from Kessler and colleagues' Hurricane Katrina Community Advisory Group (2006) archives. Participants identified whether they experienced each circumstance within the first month after the hurricane and rated the extent to which it was stressful. "Yes" responses to nine SES resource deficits was summed, including the following: problems with finances, health care access, housing, limited access to basic necessities, accessing government emergency aid, insurance benefits, lack of resources needed to remain in New Orleans, accessing daily living resources, and problems with the availability of schools for their children. Because four of the nine SES deficits could be confounded with chronic lack of resources, we also calculated a subscale of SES resource deficits that were definitely acute, that is, a sum of the last five deficits listed above (henceforth referred to as *acute SES resource deficit*). Ratings of the magnitude of stress associated with each experience were not included in this calculation to reduce the likelihood of current mental health status biasing reports of SES resource difficulty.

Hurricane trauma—Hurricane trauma was assessed using responses to four items from the 24-item hurricane experience questionnaire referenced above. Hurricane trauma scores were count scores of the number of traumatic experiences endorsed from among the following: life threatening experience, sexual victimization, violent victimization, and sightings of mutilated or dead bodies.

Mental and physical health measures—*Current MDD diagnosis* was assessed using the Patient Health Questionnaire (PHQ-9; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999), which uses the 2 weeks prior to survey as the reference period. The nine items of this questionnaire directly reflect the nine *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)* criteria for MDD. The PHQ-9 is both sensitive and specific in diagnosing depression (Kroenke, Spitzer, & Williams, 2001). The internal reliability and test–retest reliability of the PHQ-9 is typically acceptable; that is, above .80 (Kroenke et al., 2001). Item ratings were also internally consistent in this sample ($\alpha = .94$). A dichotomous depression diagnosis variable was created by giving a score of 1 (depression diagnosis) to participants who reported experiencing at least five of the symptoms at least “more than half the days” and reported experiencing depressed mood or hopelessness and/or little interest or pleasure in activities at least “more than half the days.” This coding conforms to guidelines from the MacArthur Initiative on Depression and Primary Care (2009). *Current PTSD diagnosis* was assessed using the PTSD Checklist-Specific (PCL-S; Weathers, Litz, Herman, Huska, & Keane, 1993), which uses the month prior to survey as the reference period. A dichotomous PTSD variable was created by giving a score of 1 (PTSD diagnosis) to participants who rated one or more of the five re-experiencing items as at least “moderately,” three or more of the seven avoidance items as at least “moderately,” and two or more of the five arousal items as at least “moderately.”

Cardiometabolic event and pain were assessed using a checklist of 13 health events pre-and post-Hurricane Katrina. Participants who endorsed at least one of the following health events as happening post-Katrina received a 1 on the cardiometabolic event outcome: heart attack, stroke, and serious diabetic complications. Participants who endorsed frequent migraine headaches, frequently unbearable pain, or both as happening post-Katrina received a 1 on the pain outcome. *Body mass index (BMI)* was calculated based on self-reported weight and height using the Imperial BMI formula (i.e., $\text{weight}^*703/\text{height}^2$) and the BMI calculator of the National Health Lung and Blood Institute (<http://www.nhlbisupport.com/bmi/>). In accordance with NHLBI’s guidelines, individuals with BMI ≥ 30 were considered obese. *Smoking status* was measured by self-reported habitual cigarette smoking after the hurricane.

Statistical Analysis

Preliminary analyses—The distributions of all SES variables and incidence or prevalence rates of health outcomes were examined for descriptive purposes. Given that our hypothesis-testing models include various indicators of SES, we tested the associations between the SES indicators to evaluate whether the degree of multicollinearity was acceptable.

Multivariate analyses—A series of hierarchical binary logistic regressions was conducted for each of the five health outcomes. Each logistic regression included age, gender, and marital status as demographic covariates; education and neighborhood poverty as stable SES covariates; and hurricane trauma. Regressions including acute employment as the primary acute SES predictor included current unemployment as an additional covariate.

Regressions including SES resource deficit as the primary acute SES predictor were conducted with and without the quadratic transformation of SES resource deficit in order to determine whether the association between SES resource deficit and health outcomes was linear or nonlinear. A significant nonlinear effect would suggest that the association between SES resource deficit and health is stronger among those with more pervasive amounts of SES resource deficits.

The cardiometabolic event regression included additional adjustment for obesity and smoking status and did not include data from participants who had experienced a cardiometabolic event prior to the hurricane. The pain regression included additional adjustment for prehurricane pain. The MDD and PTSD regressions were conducted with and without additional adjustment for pre-hurricane counseling.

Results

Frequency of Acute SES Decline Variables and Health Outcomes

Unemployment within the month following the hurricane was experienced by 25% of the sample. Table 2 summarizes the frequencies of SES resource deficits in the sample. Involuntary relocation, insufficient finances, and lack of access to government emergency aid were the resource deficits most often experienced. Eighteen percent of the sample did not experience any SES resource deficit, 18% experienced one SES resource deficit, 16% experienced two SES resource deficits, and 23% experienced six or more SES resource deficits. Cumulative 4.5-year posthurricane incidence of new cardiometabolic events and chronic pain were each less than 20%, whereas MDD and PTSD diagnoses were somewhat more common, that is, 23% and 26% point prevalence, respectively. Figure 1 depicts the extent to which the proportion of the sample experiencing each health outcome varied by acute unemployment and SES resource deficit arbitrarily divided at 6 or more. This cutoff was chosen because it represents the top quartile of individuals experiencing the most SES resource deficit and, thus, clearly illustrates the health differences between those with low resource deficit and those with high resource deficit.

Table 2 distinguishes between the SES resource deficits and those denoted as definitely acute, that is, *acute* SES resource deficits. Twenty-seven percent of the sample did not experience any of the acute SES resource deficits, 25% experienced one acute SES resource deficit, 15% experienced two acute SES resource deficits, and 8% experienced all five designated acute SES resource deficits.

Evaluating Multicollinearity: Associations Between SES Indicators

The magnitude of the associations between the SES variables was not high. There were small associations between education and acute unemployment ($\eta^2 = .02, p = .05$) and education and acute SES resource deficit ($r_s = .20, p < .01$). There was a small, marginal association between current unemployment and acute SES resource deficit ($r_s = -.13, p = .07$). Neighborhood disadvantage was not associated with any of the SES variables. Our primary predictors of interest, acute unemployment and acute SES resource deficit, were

moderately associated ($r_s = .37, p < .001$), so their associations with health outcomes were tested in separate primary analyses.

Acute Employment and Health

With adjustment for covariates and stable prehurricane SES, acute unemployment was associated with cardiometabolic risk ($OR = 5.51, p < .05$), MDD ($OR = 3.01, p < .01$), and pain ($OR = 3.12, p < .05$) but not with PTSD ($OR = 1.63, p = .25$). With further adjustment for hurricane trauma, acute unemployment remained associated with cardiometabolic risk ($OR = 5.65, p < .05$; Table 3), MDD ($OR = 2.76, p < .05$; Table 4), and pain ($OR = 2.76, p < .05$). In the final regressions, neighborhood poverty was associated with cardiometabolic risk ($OR = 3.75, p < .05$) and trended toward association with MDD ($OR = 1.98, p = .07$). Including prehurricane counseling in the MDD and PTSD models did not significantly alter the odds ratios or significance tests so results without adjustment for prehurricane counseling are reported in tables.

SES Resource Deficit and Health

With adjustment for covariates and stable prehurricane SES, SES resource deficit was associated with PTSD ($OR = 1.28, p < .01$) and pain ($OR = 1.48, p < .001$) but not with cardiometabolic risk ($OR = 1.15, p = .20$) or MDD ($OR = 1.08, p = .27$). With further adjustment for hurricane trauma, SES resource deficit remained associated with pain ($OR = 1.40, p < .01$) but was no longer significant associated with PTSD ($OR = 1.13, p = .16$). Including prehurricane counseling in the MDD and PTSD models did not significantly alter the odds ratios or significance tests so results without adjustment for prehurricane counseling are reported.

Subanalysis with only identifiably acute SES resource deficits—To rule out the possibility that the association between SES resource deficit and pain was driven by chronic lack of resources, we repeated this analysis with the acute resource deficit subscale in the place of the full scale. With adjustment for covariates and stable prehurricane SES, this acute SES resource deficit subscale was also associated with pain ($OR = 2.02, p < .001$). This association held with further adjustment for hurricane trauma ($OR = 1.93, p < .001$; Table 5). Inclusion of the quadratic transformation of acute SES resource deficit improved model fit, that is, Cox and Snell R^2 improved from .25 to .34, and the quadratic was significantly associated with pain ($OR = 1.53, p < .01$).

In addition, although the full resource deficit scale was not associated with CVD or MDD, the quadratic transformation of acute SES resource deficit was significantly associated with MDD after adjustment for all other variables ($OR = 1.19, p < .05$).

Discussion

Mostly consistent with study hypotheses, study findings suggest that acute SES decline is a risk factor for physical health symptoms, serious physical health events, and long-term mental illness. Specifically, findings indicate that, compared with those who maintained employment, those who became unemployed immediately after the hurricane had five times

higher odds of experiencing a cardiometabolic event within the 5-year period posthurricane, two times higher odds of experiencing chronic pain within this 5-year period, and three times higher odds of meeting criteria for MDD 4–5 years' posthurricane. Findings also indicate that the odds of experiencing chronic pain within the 5-year period after the disaster are approximately two times higher for each SES resource that participants had acute difficulty accessing immediately after the hurricane. Associations are moderately strong (see Chinn, 2000, for formula for transforming odds ratios to effect sizes) and are not confounded with age, gender, marital status, prehurricane SES, or hurricane trauma. In addition, exploratory analyses found that odds of MDD and pain increase in a nonlinear fashion at higher levels of acute SES resource deficit. Not surprisingly, neighborhood poverty was also independently associated with greater odds of cardiometabolic event and trended toward being associated with greater odds of meeting criteria for MDD. Results are consistent with studies of Hurricane Katrina survivors that demonstrated that difficulty accessing SES resources, such as money, steady housing, and food, was strongly associated with mental illness and perceived health deterioration up to 2 years after the hurricane (Galea et al., 2007; Lu, 2011). We extended this literature by investigating the effects of acute unemployment and SES resource deficit on multiple long-term outcomes in a demographically and socioeconomically diverse sample of African Americans. Another unique characteristic of this study is the conservative test of these associations with consideration for pre-hurricane individual SES, neighborhood SES, and trauma.

The associations found between acute SES decline and health are plausible in the context of research regarding the emotional, behavioral, psychosocial, biological, and contextual effects of low SES (for a review, see Matthews & Gallo, 2011). Even more, the finding that acute disruptions in SES and resource access are associated with health give further support to Hobfoll and colleagues' conceptual assertions that acute manifestations of socioeconomic problems or changes may be more proximal representations of individual socioeconomic well-being than chronic socioeconomic deprivation, which might be experienced differently in different life contexts (Ennis, Hobfoll, & Schröder, 2000). In the context of this assertion and the Reserve Capacity Model (Gallo & Matthews, 2003), these acute SES disruptions may be viewed as causing acute bursts of negative emotions, stressful circumstances, and use of already taxed psychosocial resources, the accumulation of which can lead to long-term poor emotional and physical health. The nonlinear finding that odds of health problems tend to increase faster at higher acute SES resource deficit levels might also be interpreted in this conceptual context. It may be that an individual's resilience to the emotional, biological, and cognitive assaults of socioeconomic decline more easily collapses as these assaults accumulate; thus, each deficit leaves an individual more vulnerable to the health effects of every other deficit.

It is interesting that unemployment was associated with cardiometabolic events, whereas SES resource deficit was not. This difference was not hypothesized but is interesting nonetheless. This pattern is especially noteworthy given that, in this sample, those who experienced acute unemployment were likely to experience higher SES resource deficit also and that health outcomes used in this study share some biopsychosocial pathways. Perhaps distinguishing characteristics of the acute SES concepts hold the explanation for this finding. Acute unemployment is likely to be more disruptive and intense than the acute SES resource

deficits measured and, thus, likely to lead to more biological stress and physiological reactivity. This might be one reason why acute unemployment was more associated with the physical health outcome than acute SES resource deficit. Replication is needed before further conceptualization of this difference is warranted. The fact that none of our SES predictors predicted PTSD once trauma was accounted for fits with DeSalvo and colleagues' (2007) findings that education and income were not associated with PTSD after taking into account hurricane experiences (i.e., evacuation length, posthurricane commute, and death of acquaintances or loved ones). Other SES difficulties (lack of property insurance and temporary housing conditions) were associated with PTSD in that study, however, but traumatic experiences were not adjusted for in that study.

Several limitations should be considered when interpreting results. First, this study was conducted using a convenience sample exposed to a natural disaster associated with a rare amount of flooding and life disruption, so results cannot be assumed generalizable to all individuals exposed to a natural disaster. It is important to note that, although other hurricane experiences, such as nontraumatic stress, may have increased vulnerability to mental and physical illness, those of low SES are disproportionately exposed to these factors generally (Hatch & Dohrenwend, 2007) and in the context of Hurricane Katrina. In addition, relatively simple self-report measures used to assess unemployment and cardiometabolic events may have limited precision of the odds ratio estimate for this relationship. The confidence interval for the odds ratio of the association between acute unemployment and cardiometabolic event is relatively large, possibly because length of unemployment after the hurricane was not assessed and a low number of individuals reported cardiometabolic events. In addition, unemployment within 1 month of the hurricane was measured but some individuals may have become unemployed after the first month because of lasting hurricane impacts on companies and institutions. It is also important to note that smoking and obesity were not significant predictors of cardiometabolic events in multivariate analyses. This may be because of low sample incidence of cardiometabolic events and limitations of cigarette smoking assessment; that is, it did not comprehensively capture smoking behavior, only regular cigarette smoking posthurricane. Finally, this study relies on retrospective report of hurricane experiences and health outcomes. However, this is unlikely to have significantly biased results, given that the events reported are not likely to be forgotten or misremembered. Nevertheless, causality cannot be assessed using our data. For example, although prehurricane health was controlled whenever possible, there is a possibility that preexisting, preclinical health vulnerabilities may have led to unemployment as well as the health outcomes measured rather than unemployment leading to the health outcomes (Korpi, 2001). The results of this study must be replicated in prospective studies of other disaster-exposed samples before public health implications can be specified with more certainty.

Despite limitations, this study is one of the first to assess systematically and comprehensively the relationship between acute SES decline and long-term health in a socioeconomically diverse sample of African American Hurricane Katrina survivors. The robustness of the acute SES effects found here suggests that socioeconomic well-being should be given attention alongside traumatic experiences in the aftermath of disasters. Disaster studies should continue in this vein of conceptual and empirical disentangling of socioeconomic and traumatic circumstances in disaster-exposed samples. With replication,

this study supports public health actions to relieve the burden of acute SES decline among disaster survivors and the general population. Future research should examine mediators and moderators of the reported associations. Given evidence that the relationship between SES and health might be mediated through psychosocial (see Matthews, Gallo, & Taylor, 2010 for a review), behavioral (Barkley, 2008), and environmental factors, these mediating pathways should be explored in the relationship between acute SES decline and health.

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Figure 1. Percentages experiencing health events by acute unemployment and significant socioeconomic (SES) resource deficit. For the purposes of illustration, High Resource Deficit = difficulty accessing six or more socioeconomic resources. CME = cardiometabolic event.

Table 1

Characteristics of the Study Sample (n = 215)

Characteristic	% (<i>n</i>) or <i>M</i> (<i>SD</i>)
Mean age (<i>SD</i>)	38.6 (12.0)
% Female (<i>n</i>)	59.5 (128)
Marital status	
% Single, never married (<i>n</i>)	47.6 (100)
% Married (<i>n</i>)	36.2 (76)
% Separated/divorced (<i>n</i>)	11.4 (24)
% Widowed (<i>n</i>)	4.8 (10)
% BMI ≥ 30 (<i>n</i>)	24.2 (52)
Education completed	
% Less than high school (<i>n</i>)	51.5 (97)
% Some college/technical (<i>n</i>)	18.1 (34)
% Bachelor's degree (<i>n</i>)	16.5 (31)
% > Bachelor's degree (<i>n</i>)	13.8 (26)
Employed full-time or part-time (<i>n</i>)	72.6 (151)
Prehurricane residence	
% Downtown (<i>n</i>)	19.0 (41)
% Uptown (<i>n</i>)	20.0 (43)
% New Orleans East (<i>n</i>)	21.9 (46)
% Other (<i>n</i>)	39.1 (85)
% Prehurricane neighborhood poverty >30% (<i>n</i>)	29.8 (64)

Table 2

Socioeconomic Status (SES) Resource Deficit Experienced During the Hurricane

SES resource deficit	% (<i>n</i>)
Insufficient finances	52.0 (103)
Insufficient access to healthcare	19.2 (38)
Insecure housing	29.6 (59)
Insufficient access to basic necessities ^a	29.1 (58)
Impeded government emergency aid (X)	44.9 (89)
Impeded insurance aid (X)	31.2 (62)
Involuntary relocation (X)	60.6 (120)
Insufficient access to daily living resources ^b (X)	30.7 (61)
Difficulty accessing education for children (X)	13.6 (27)

Note. (X) indicates those items in the acute SES resource deficit subscale.

^aThis term designates the item that asked participants whether they experienced difficulty accessing water, basic foods, and medications.

^bThis term designates the item that asked participants whether they experienced difficulty accessing goods, telecommunication, and utilities.

Table 3

Multivariate Adjusted Odds Ratios (ORs) for Cardiometabolic Event (CME)

Variable	CME	
	OR	95% confidence interval
Age	1.04	.99–1.10
Male gender	.50	.11–2.15
Married	.52	.10–2.78
Body mass index ≥ 30	.59	.12–2.84
Current smoker	2.65	.55–12.91
Education (years)	.81	.62–1.06
High-poverty neighborhood	3.75*	1.04–13.53
Current unemployment	4.04*	1.02–16.10
Acute unemployment	5.65*	1.49–21.40
Trauma	.91	.46–1.78

*
 $p < .05$.

Table 4

Multivariate Adjusted Odds Ratios (ORs) for Major Depressive Disorder (MDD)

Variable	MDD	
	OR	95% confidence interval
Age	.97 [‡]	.94–1.00
Male gender	1.69	.82–3.51
Married	.84	.36–1.96
Education (years)	.09	.79–1.03
High-poverty neighborhood	1.98	.95–4.15
Current unemployment	1.20	.45–3.22
Acute unemployment	2.76 [*]	1.22–6.21
Trauma	1.16	.81–1.64

*
 $p < .05$.[‡]
 $p < .05$.

Table 5

Multivariate Adjusted Odds Ratios (ORs) for Pain

Variable	Pain	
	OR	95% confidence interval
Age	.97	.92–1.02
Male gender	1.29	.40–4.12
Married	2.58	.78–8.52
Prehurricane health ^a	.12*	.02–.77
Education (years)	.95	.82–1.10
High-poverty neighborhood	1.12	.36–3.49
Acute socioeconomic status resource deficit	1.93***	1.34–2.79
Trauma	1.80*	1.06–3.05

^a Indicates not experiencing chronic pain at any time before the hurricane.

* $p < .05$.

*** $p < .001$.